REMARKS

Claims 1-10 and 12-16 are pending. Claims 1-10 and 12-16 are rejected.

Claims 1-4, 6-10, and 12-16 are rejected under 35 USC 103 (a) as being unpatentable over Hansen et al. US 6340411 in view of Cook et al., US 5,562,740 and further in view if Arifroglu, US 5,103,522.

Claims 1-5 and 14-15 are rejected under U.S.C. 103 (a) as being unpatentable over Hansen et al., Cook et al. and Arifoglu et al. as applied to Claim 1 and further in view of Smith et al. (US 2002/0090511).

Claims 1-8 and 12-13 are provisionally rejected under the judicially created doctrine of obvious-type double patenting as being unpatentable over claims 1, 5-8, 10-12 and 16-17 of copending Application No. 10/748930 in view of Cook et al. and Arifoglu et al.

The Rejection of Claims 1-4, 6-10, and 12-16 Under U.S.C. 103(a)

The rejection of the Claims is respectfully traversed. Applicants submit the Examiner has not established a *prima facie* case of obviousness.

Claim 1 has been amended to cite the Whiteness Index of at least about 70 for crosslinked fibers prepared by crosslinking cellulose with a crosslinking agent in the presence of a polyol and not bleached.

Hansen et al. disclose the use of polymeric and nonpolymeric binders for binding particles to fibers and to densify fibers. The non polymeric binders include for example, *polyols, polyamines, polyamides, polycarboxylic acids, polyaldehydes, amino alcohols and hydroxy acids,* column 4, line 42-49. Hansen et al. indicate that the non-polymeric binder is preferably selected from the group consisting of glycerine, a glycerine monoester, glyoxal, ascorbic acid, urea, glycine, pentaerythritol, a mono or disaccharide, citric acid, tartaric acid, taurine, p-aminosalicylic acid, dipropylene glycol and urea derivatives such as DMEDHEU, and combinations thereof, and various saccharides, column 4, line 52- line 60. Hansen et al. also state that densifying agents include organic polymeric and non- polymeric binders. The preferred non- polymeric binders for densification without particles

include sorbitol, glycerin, propylene glycol and mixtures thereof, column 59, line 18 - 32.

Hansen et al. state that specific types of binders that can crosslink are *polyols, polyaldehydes, polycarboxylic acids and polyamines;* Hansen does not state which combination can be used to crosslink cellulose. When the binder is applied to high bulk fibers it is preferable that the application occurs after the curing step particularly if the binder is capable of acting as a crosslinking material since if it is available during the curing step the binder will be consumed during the curing step to form covalently crosslinked bonds, column 34, line 1-13, a result that would destroy the effectiveness of the binder and the invention. (Note again that Hansen et al. do not state that mixtures of polyols, polyaldehydes, polycarboxylic acids and polyamines can be used for crosslinking). Hansen et al. state that in processes that *use polyols, polyaldehydes, polycarboxylic acids and polyamines*, the fibers should contain at least 20 % by weight water if the particles and binder are present in the fiber when curing occurs to inhibit covalent bond formation and prevent all the binder from being used to form covalent intrafiber crosslinks, column 34, line 20-28. Again, Hansen et al. do not state *mixtures* of *polyols, polyaldehydes, polycarboxylic acids and polyamines* can be used to crosslink. Also in column 53, Example 32, lines 37-53, Hansen states that the binder can form covalent intrafiber crosslinks. *Polycarboxylic acids (such as citric acid), polyols, (such as dipropylene glycol) and polyamines (such as ethylene diamine*) can function as crosslinking agents and are consumed during the curing step in the formation of covalent crosslinks. Note that mixtures are not mentioned. Accordingly, in the limited case in which the crosslinking agent is also a binder, steps should be taken to prevent the binder from being consumed as a crosslinker in the curing step thus maintaining its binding ability. Stated in another way, crosslinking with the binder destroys the binder and makes it inoperable to bind the particles, and binding of the particles is one of the very objects of the Hansen et al. reference. Applicants submit that even in these situations where the binder may act as a crosslinking agent, Hansen et al. do not teach the mixture of a crosslinking agent and a polyol in the intrafiber crosslinking reaction to arrive at the instant invention of Claim1. Thus Hansen et al. is only an invitation to virtual endless experimentation.

Hansen et al. give no guidance to the skilled artisan as to which binders or combination of binders from the group of to pick to achieve the instant invention. While Hansen et al. state that *polyols, polyaldehydes, polycarboxylic acids and polyamines* can crosslink, there is no guidance given as to which which genus or species can be combined in the crosslinking reaction with cellulose fibers to arrive at the instant invention. Thus the skilled artisan would be required to perform virtually endless experimentation to arrive at the instant invention.

Applicants do not dispute that polycarboxylic acids can crosslink. While Hansen et al. state that polyols and specifically dipropylene glycol can form intrafiber crosslinks, and because sorbitol is a polyol, it does not necessarily follow that all polyols crosslink with cellulose fibers. Applicants have shown that this is not true in the case of the sub genus acyclic polyols of which sorbitol and xylitol are species. The Examiner is requested to review the Declaration of Mr. Angel Stoyanov. Mr. Stoyanov states that an increase in FAQ wet bulk, relative to an untreated control, reflects that fibers have been crosslinked. As evidence, the Examiner is requested to review Table 1 of the Stoyanov Declaration. Here it is clearly shown that pulp alone, Sample A, has a FAQ wet bulk of 11.59 and Whiteness Index, $WI_{(CDM-L)}$, of 78.16. When pulp is treated with 2 % by dry weight sodium hypophosphite, FAQ wet bulk is 12.26 cc/g and $WI_{(CDM-L)}$ is 77.87. When pulp is treated with citric acid and sodium hypophosphite, Sample C, the FAQ wet bulk is increased to 18.48 cc/g and the $WI_{(CDM-L)}$, is 68.69. When pulp is treated with citric acid, sodium hypophosphite and sorbitol, a polyol, at the 2 and 6 percent by weight level of sorbitol on pulp, Samples D and E, respectively, FAQ wet bulk is 18.29 and 17.05 cc/g, respectively, essentially the same as with sodium hypophosphite and citric acid alone. The $WI_{(CDM-L)}$, of Samples D and E, is increased to 78.71 and 81.30, respectively. However, when pulp is treated only with sodium hypophosphite and two different levels of sorbitol, 2 and 6 percent by weight, Samples H and I, there is no increase in FAQ wet bulk; $WI_{(CDM-L)}$ decreased relative to the control pulp and the pulp sample with only sodium hypophosphite, Samples A and B, respectively. These results are new and unexpected.

When pulp is treated with citric acid, sodium hypophosphite and xylitol, a polyol, at the 2 and 6 percent by weight level of xylitol on pulp, Samples F and G, respectively,

FAQ wet bulk is 18.18 and 16.83 cc/g, respectively but at the 2 percent by weight addition level, is not different from only treating the pulp with citric acid and sodium hypophosphite, Sample C which has a FAQ wet bulk of 18.48. The$WI_{(CDM-L)}$, of Samples F and G, also increased to 78.50 and 82.10, respectively. At the 6 percent addition level of xylitol, there is actually a reduction in FAQ wet bulk to 16.83 cc/g. However, when pulp is treated only with sodium hypophosphite and two different levels of xylitol, 2 and 6 percent by weight, Samples J and K, both FAQ wet bulk and $WI_{(CDM-L)}$, decreased relative to the control pulp and the pulp treated with only sodium hypophosphite, Samples A and B, respectively.

It is clear therefore that, contrary to the statements of Hansen et al., polyols do not crosslink with cellulose fiber under the conditions of the instant invention and the results of reacting cellulose with a crosslinking agent in the presence of a polyol are new and unexpected and therefore nonobvious.

Hansen does not teach bleached crosslinked fibers in which cellulose fibers have been reacted with a crosslinking agent in the presence of a C_4-C_{12} polyol and the bleached to give a Whiteness Index at least one unit greater than the same fibers which are not bleached and that have a Whiteness Index of at least about 70.

The Examiner states that the Hansen et al reference teaches that crosslinked fibers can be used in absorbent products. Applicants respectfully disagree. Hansen et al. only state that in particular embodiments, the invention concerns cellulosic fibers which then may be used to make absorbent fibers that are densified and incorporated into absorbent products, column 2, line 1-3. Absorbent products include diapers, sanitary napkins, incontinent pads, towels etc.

Cook does not teach the bleaching of cellulose fibers crosslinked with a crosslinking agent in the presence of a polyol nor does he teach the Whiteness Index increase of at least one unit over the same unbleached fibers which have a Whiteness Index of at least 70. Cook only teaches that bleaching of the crosslinked fibers can improve brightness to 80- 86 from 70 – 75, column3, line 49-52.

Arifoglu et al. teach the sequential oxidative and reductive bleaching of fibers. Arifoglu does not teach bleaching cellulose fibers crossslinked with a crosslinking agent

in the presence of a polyol followed by bleaching. While Whiteness Index increases are realized, the reference does not show an increase of at least one unit over an unbleached sample with a Whiteness Index of 70.

Hansen et al. disclose that polyols, polyamines, polyamides, polycarboxylic acids, polyaldehydes, amino alcohols and hydroxy acids can be used to bind fibers to particles. Hansen also states that polyols, polyaldehydes, polycarboxylic acids and polyamines can crosslink but when the binder is used as a crosslinking agent the fibers should contain 20 % water to prevent covalent bond formation. Not having this amount of water present would destroy the very object of the Hansen et al. invention i.e. there would be no binder available for binding the fiber to particles and thus would make the Hansen the invention inoperable. Hansen also does not give guidance as to which binders or combinations would give crosslinking. Thus virtually endless experimentation would be required to arrive at the instant invention. Applicants submit that contrary to Hansen et al. stating that polyols can form intrafiber crosslinks it has been shown in the Stoyanov declaration that the acyclic polyols, sorbitol and xylitol do no crosslink under the conditions of the invention. The results of crosslinking cellulose with a crosslinking agent in the presence of a polyol are new and unexpected and nonobvious. Hansen et al. also do not teach the Whiteness Index as claimed. Cook et al. do not teach bleaching of cellulose fibers crosslinked with a crosslinking agent in the presence of a polyol nor the Whiteness Index increase of at least one unit over unbleached fiber prepared in the same manner. Arifoglu et al. also do not teach bleaching of cellulose fibers crosslinked with a crosslinking agent in the presence of a polyol nor the Whiteness Index increase of at least one unit over unbleached fiber prepared in the same manner with a Whiteness Index of at least 70. Thus all the elements of the claim are not present. Based on the above arguments, Applicants submit the Examiner has not established a *prima facie* case of obviousness and withdrawal of the rejection is respectfully requested.

<u>The Rejection of Claims 1-5 and 14-15 Under U.S.C. 103(a)</u>

Claim 1 is an independent claim, Claims 2-4 and 14 and 15 are dependent on Claim 1. Applicants submit that Claim 1 is nonobvious. If and independent claim is

nonobvious under 103 then any claim dependent therefrom in nonobvious. *In re Fine,* 837 F.2d 1071, 5USPQ2d 1596 (Fed. Cir. 1988).

Hansen et al. disclose that polyols, polyamines, polyamides, polycarboxylic acids, polyaldehydes, amino alcohols and hydroxy acids can be used to bind fibers to particles. Hansen also states that polyols, polyaldehydes, polycarboxylic acids and polyamines can crosslink but when the binder is used as a crosslinking agent the fibers should contain 20 % water to prevent covalent bond formation. Not having this amount of water present would destroy the very object of the Hansen et al. invention i.e. there would be no binder available for binding the fiber to particles and thus would destroy the invention. Hansen also does not give guidance as to which binders or combinations would give crosslinking. Thus virtually endless experimentation would be required to arrive at the instant invention. Applicants submit that contrary to Hansen stating that polyols can form intrafiber crosslinks it has been shown in the Stoyanov declaration that the acyclic polyols, sorbitol and xylitol do no crosslink under the conditions of the invention. Hansen et al. also do not teach the Whiteness Index as claimed. Cook et al. do not teach bleaching of cellulose fibers crosslinked with a crosslinking agent in the presence of a polyol nor the Whiteness Index increase of at least one unit over unbleached fiber prepared in the same manner. Arifoglu et al. also do not teach bleaching of cellulose fibers crosslinked with a crosslinking agent in the presence of a polyol nor the Whiteness Index increase of at least one unit over unbleached fiber prepared in the same manner with a Whiteness Index of at least 70.

Neither Hansen, Cook, nor Arifoglu teach malic acid as a crosslinking agent.

Smith et al. indicate that it is desirable that bleached pulp be used in their invention in which the fibers are first refined and then crosslinked. Smith et al. do not recognize the adverse effect on color as shown by Cook et al. in US 5562740 when using, for example, citric acid, column 3, line 33- 38 and the need for improving color post crosslinking. Smith et al. do not teach crosslinking of cellulose in the presence of a polyol nor the fiber characteristics related to Whiteness Index after bleaching. Withdrawal of the rejection is respectfully requested.

<u>The Provisional Obvious Type Double Patenting Rejection</u>

Claims 1-8 and 12-13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5-8, 10-12 and 16-17. Applicants note the provisional double patenting rejection and will file a terminal disclaimer on the Examiner's indication of allowable subject matter.

CONCLUSION

In view of the, the amended claims and the foregoing remarks, applicants submit claims 1-10 and 12-16 are in condition of allowance. If any issues remain that may be expeditiously addressed in a telephone interview, the Examiner is encouraged to telephone the applicant's agent.

Respectfully submitted

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